
Missouri Asthma Prevention and Control Program

Surveillance Update



**Missouri Department of Health and Senior Services
Division of Community and Public Health**

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Report Information

Title: Missouri Asthma Prevention and Control Program: Surveillance Update

Description: This report provides an update on program and partnership activities and the impact on the burden of asthma in terms of acute health care utilization trends and particularly in selected areas with asthma champions.

Audience: This report is intended for use by partners and stakeholders, state and local policy makers, researchers, health care personnel, local public health agencies, voluntary organizations, funders, and the general public.

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Executive Summary

Asthma is a major chronic respiratory condition that may lead to disability and adversely affect quality of life when not well controlled. In 2014, more than one-half million adults (9.7%) and children (11.2%) were living with the condition in Missouri. Pediatric asthma results in missed learning opportunities, elevated acute health care utilization, and costs. Established in 2001, the Missouri Asthma Prevention and Control Program (MAPCP) mission of reducing the impact of asthma in Missouri has continued. Integrating clinical care and public health has yielded strong partnerships and innovative interventions for improved asthma outcomes in the pediatric population. The asthma program has helped create and put in place large scale interventions such as the Teaming Up for Asthma Control (TUAC), partner initiatives such as Childhood Asthma Linkages in Missouri (CALM), and countywide comprehensive initiatives (Dunklin and Washington counties) which involved training school nurses and health care providers and strengthening linkages between school nurses and primary care doctors. Continued improvement in systems of care and changes in policy will improve quality of life and decrease direct and indirect economic loss attributed to asthma. Analysis of hospital discharges, emergency department (ED) visits, and Medicaid claims data demonstrate that positive changes are occurring statewide.

Emergency Department Visits and Hospitalizations

- The age-adjusted asthma hospitalization rate decreased significantly from 12.4 in 2000 to 11.5 in 2014 per 1,000 population, with a steady decline from 2008-2013.
- Among children, there have been significant declining trends in asthma hospitalization rates per 10,000 population among children for three of the four age groups: < 1 year from 33.5 in 2002 to 8.5 in 2014; 1 to 4 years from 41.6 in 2004 to 35.8 in 2014; and 10 to 14 years from 14.7 in 2000 to 11.0 in 2014. Among children aged 5 to 9 years, there was a significant increase in asthma hospitalizations comparing 2004 and 2012 (18.9 vs 24.0 per 10,000 population).
- Although African-Americans are disproportionately affected by asthma and have consistently had higher ED visits and hospitalizations from the disease than whites, there has been a significant downward trend for asthma hospitalizations among African Americans (all ages combined) from 41.9 in 2008 to 35.5 per 10,000 population in 2014. There has also been a 23.1% decrease in the racial disparity for asthma hospitalizations between white and African-American children younger than 15 years of age.
- In Dunklin County, the asthma hospitalization rates among children ages 14 and younger fell from 160.4 in 2002 to 37.0 per 10,000 children in 2014.
- In Washington County, the asthma emergency department visit rate was reduced by almost one-half, from 20.3 in 2002 to 10.2 per 1,000 children in 2014, although asthma ED visit rates for Missouri remained steady.
- In areas such as Barton, Cedar and Polk counties with the CALM program and other initiatives, there was a decline in asthma ED visit rates among children < 15 years of age for the three combined counties from 7.7 in 2003 to 4.8 per 1,000 children in 2008, but this was not statistically significant.

Three Group Comparisons: MO HealthNet, CHIP, and Non-MO HealthNet

The Missouri Department of Social Services (DSS) provides health care for uninsured children through the Children's Health Insurance Program (CHIP). In 2007, Missouri's CHIP began operating as a combined Medicaid/CHIP program, entitled *MO HealthNet for Kids*. The Missouri Children's Health Insurance Program (CHIP) and Show Me Healthy Babies Annual Report 2016 revealed:

- From 2000 to 2014, there was a significant decrease in asthma preventable hospitalizations among MO HealthNet (Medicaid children) population (-34.8%, $p < 0.001$) and for the non-MO HealthNet group (-18.2%). Preventable asthma hospitalizations for the CHIP population decreased by 39.0%.
- In 2014, the CHIP preventable hospitalization rate of 1.7 per 1,000 children was 24% lower than the national benchmark rate of 2.25 asthma preventable hospitalizations per 1,000 children. The MO HealthNet population remained 33% higher than the national benchmark.

Smoking among Pregnant Women

- For children < age 1 from 2000 to 2014, there have been significant declining trends in asthma ED visits and hospitalizations. Likely contributing to these declines is the significant decline in the prevalence of smoking among pregnant women in Missouri from 24.8% in 1990 to 16.7% in 2014. Nevertheless, the prevalence of smoking among pregnant women in Missouri remains almost twice that of the U.S. in 2014 (16.4% vs 8.4%).

Health Outcomes

The MAPCP has launched evaluations of two large scale asthma control strategies: The Early Childhood Asthma Initiative (ECAI) and Teaming Up for Asthma Control (TUAC). The ECAI provided asthma control training, tools, and equipment to staff in local public health agencies (LPHAs) statewide. The staff provided information to childcare centers on indoor air quality and asthma triggers and education to families on in-home air quality and asthma management in pre-school children.

"*Teaming Up for Asthma Control*" is a work force development intervention to improve asthma control among children by increasing school nurse competency through online education and expert mentoring and delivering guideline-based education. These initiatives have increased provider knowledge and health outcomes among children including:

- Improved lung function, inhalation technique, psychosocial indicators, increased use of control medication (i.e., inhaled corticosteroids), and reduced impairment and tobacco smoke exposure.
- For children enrolled in TUAC and MO HealthNet, there was a decline in the post-intervention 12-month total health care utilization cost.

Mortality

- There has been a significant decline in asthma mortality rates among whites from 1.1 in 2000 to 0.5 per 100,000 population in 2011 and also a decline, but not significant, among African Americans from 5.1 in 2000 to 4.4 per 100,000 in 2014; however, in 2014 significantly more African-Americans died of asthma than whites, 4.4 versus 0.9 per 100,000 population.

Conclusion

Reducing the morbidity associated with asthma remains a significant public health challenge in Missouri and in the nation. The progress toward reducing the burden of asthma is demonstrated in the overall decline in asthma hospitalizations, disparities, and deaths in Missouri, but more needs to be done with substantial disparities persisting.

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Introduction

Asthma is a major chronic respiratory condition that may lead to disability and adversely affect quality of life when not well controlled. In 2014, more than one-half million adults (9.7%) and children (11.2%) were living with the condition in Missouri.¹ Disparities also exist, with African-American children having a significantly higher prevalence of asthma and associated morbidity.² High emergency department (ED) visit and hospitalization rates are indicators of uncontrolled asthma and risk for future exacerbations. Although the causes of asthma are not well understood, improved scientific understanding of the disease and treatments have led to substantial improvements in care and treatment, making control possible for many people. Reaching health providers and families of children with guideline-based management education is critical to control asthma symptoms and reduce the risk of preventable exacerbations and deaths.

The Missouri Asthma Prevention and Control Program (MAPCP), established in 2001, is funded by the Centers for Disease Control and Prevention (CDC) as part of the National Asthma Control Program (NACP) with a strategic focus on *Comprehensive Asthma Control through Evidence-based Strategies and Public Health-Health Care Partnerships*.^{3,4} The national program calls for states to strengthen and expand asthma control efforts in school and home settings and to partner with healthcare organizations and others to promote utilization and coverage for comprehensive asthma control services.^{5,6} The MAPCP and partners have made substantial strides in improving asthma care and health outcomes.

Asthma and School Health

An ongoing focus has been educating and expanding the capacity of school nurses to provide guideline-based care for students with asthma. From a community health intervention perspective, schools represent a highly cost-effective setting in which to achieve the greatest impact in reducing asthma related complications among school age children. School based initiatives in Missouri spanning almost two decades are shown in Table 1.

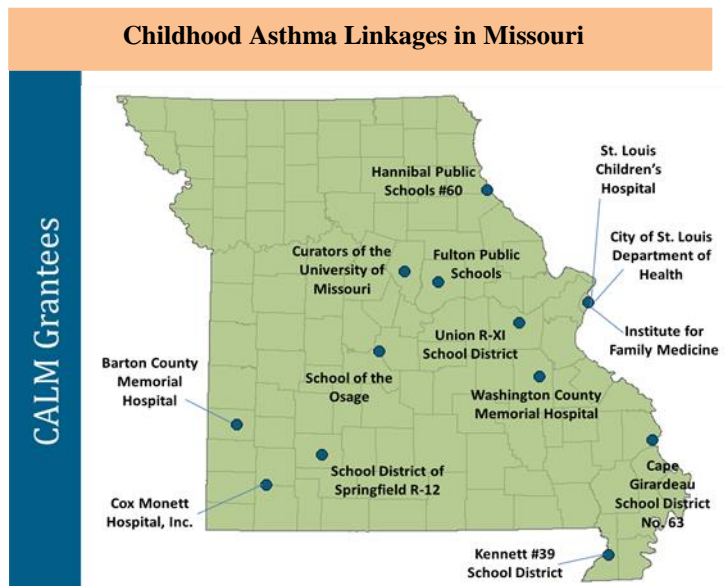
Table 1. Asthma School Health Initiatives

- 1995-“Right to Carry” asthma medication in schools legislation passed
- 1999-First School Nurse Asthma Learning Sessions and Assessment of Need
- 2001-Centers for Disease Control and Prevention (CDC) Grant *Addressing Asthma from a Public Health Perspective*
- 2002-School Nurse Survey completed, Missouri Asthma Coalition and School Health Sub-committee Formed
- 2003-School Asthma Manual Workgroup formed
- 2004-Missouri School Asthma Manual and School Staff In-service DVD Completed; 900 nurses in asthma workshops since 1999
- 2005-School Asthma Manual and Staff In-service DVD Distribution to all school districts, Missouri School Board Association School Board Member training and Disabling Asthma Survey completed
- 2006-2012 “Becoming an Asthma Educator and Care Manager” including In-Check dial and peak flow meter with more than 600 school nurses trained
- 2006-2007 Health Literacy project “Zoey and the Zones”
- 2006-2011 School Nursing Awards given to design and implement asthma control projects (299 awards in 68 counties)
- 2007 Asthma Quality Improvement project included in school health contract (over 50% of the school districts)
- 2008-2009 \$7.5 million Missouri Foundation for Health *Childhood Asthma Linkages in Missouri* (CALM) grants awarded for childhood asthma.
- 2010 *Teaming Up for Asthma Control* (TUAC) school intervention funded through CDC grant
- 2011 Missouri School Asthma Manual (2nd edition) released
- 2012 Section 167.635.1 (HB 1188) permits stock supply of asthma emergency medication in schools
- 2013 School Nurse Roundtable: St Louis Area with school nurse leaders from districts representing ~ 98,500 students
- 2014 *Childhood Asthma Linkages in Missouri* (CALM) 2 Initiative: Enhancing Asthma Care Outcomes via School Nurses with eight school districts
- 2015 School nurses participating in Impact Asthma ECHO – *Asthma Essentials*
- 2016 Asthma Panel Risk Reports to assess asthma burden in school districts

Key Asthma Initiatives

The CDC's \$3.4 million investment in MAPCP over the first decade of the program's existence has generated more than \$20 million in investments from other stakeholders.⁷ Key asthma partnership and surveillance initiatives in Missouri include:

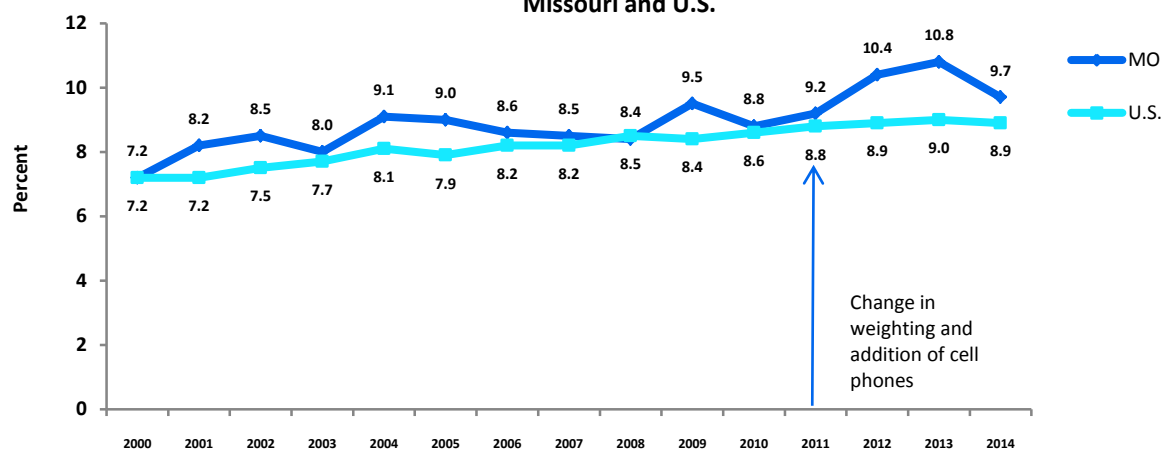
- The Childhood Asthma Linkages in Missouri (CALM) program, funded by the Missouri Foundation for Health, began in 2008 and extended across 14 urban and rural sites in Missouri with project periods ranging from three to five years.^{8,9,10}
- University of Missouri, Asthma Ready Communities has provided asthma training for > 3,600 participants including physicians, nurse practitioners, school nurses and respiratory therapists since 2009 in an effort to coordinate and improve asthma care for school age children.¹¹
- The Early Childhood Asthma Initiative (ECAI) focused on preschool children with current asthma and their families or caregivers through licensed childcare facilities utilizing the statewide local public health agencies (LPHAs) network (May 2010). Sixty-seven ECAI contracts covering 71 counties were awarded to LPHAs and 904 initial environmental assessments were completed, individual asthma consultation services were provided to 659 families, and information about safe and healthy environments was provided to 3,175 childcare facilities.¹²
- Enhancing asthma medication profiles to improve asthma control: A drug utilization review conducted by Medicaid initially in 2002¹³ and repeated in 2013-2014 to improve asthma medication regimens and reduce cost. The intervention included 670 physicians and 12,132 targeted patients.¹⁴
- Initiation of asthma risk panel reports using Medicaid administrative claims data to identify individuals with uncontrolled asthma (2014). To date, there have been 21 health centers requesting and receiving patient panel asthma risk reports covering 11,163 children and 7,563 adults.¹⁵
- Impact Asthma ECHO (Extension for Community Healthcare Outcomes) uses videoconferencing technology to form a learning interdisciplinary collaborative to improve asthma care with the University of Missouri as the hub (Section 191.1140.1, 2015).¹⁶
- State Plan Amendments to provide asthma preventive health services to Medicaid recipients (self-management education and home assessments) and make pediatric asthma a stand-alone condition to qualify for the Health Home program (2015-2016).^{17,18}



Trends in Prevalence

In 2014, almost 10% of the adults in Missouri have current asthma, representing approximately 450,530 people. The prevalence of asthma among adults with the exception of 2008 is consistently higher in Missouri than the U.S. (Figure 1). With the change in the weighting methodology and the addition of cell phones, there is no clear trend in the adult asthma prevalence in Missouri from 2011 to 2014.

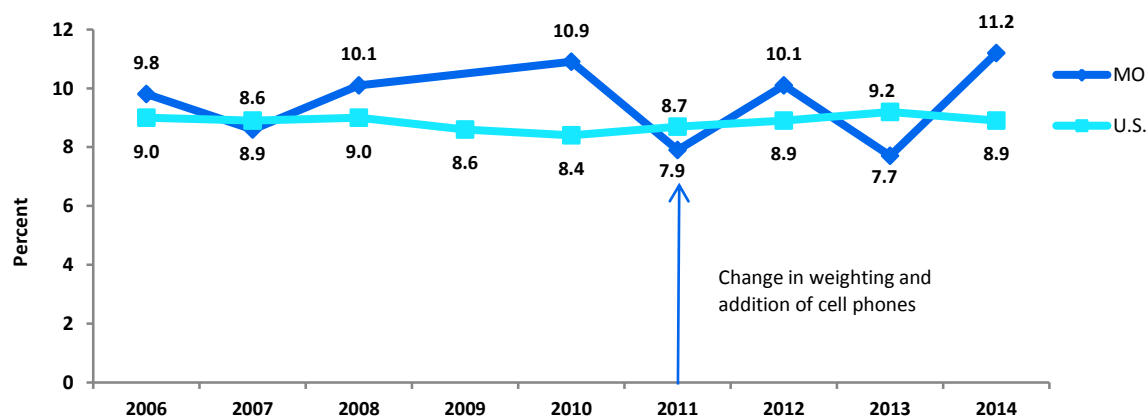
Figure 1. Current Asthma Prevalence among Adults ≥ 18 years of age, Missouri and U.S.



Source: Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System.
<https://www.cdc.gov/asthma/brfss/default.htm>

In 2014, approximately 152,000 (11.2%) Missouri children, 17 years of age and younger, had current asthma (Figure 2). The Missouri childhood asthma prevalence has fluctuated since 2011 with no clear trend for the four year period (2011-2014).

Figure 2. Current Asthma Prevalence among Children ≤ 17 years of age, Missouri and U.S.



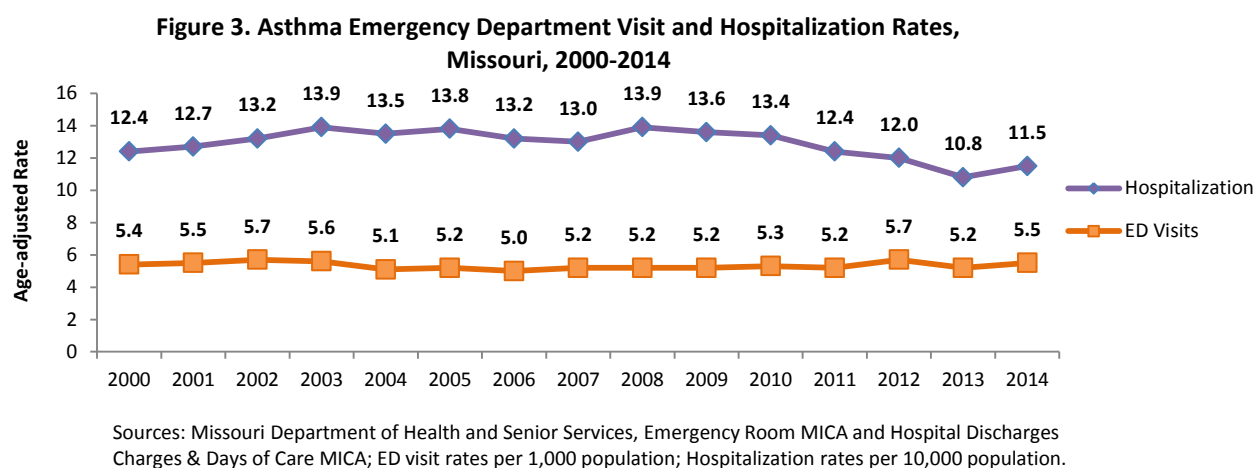
Source: Centers for Disease Control and Prevention. Behavioral Risk Factor Surveillance System.
<https://www.cdc.gov/asthma/brfss/default.htm>

Trends in Morbidity

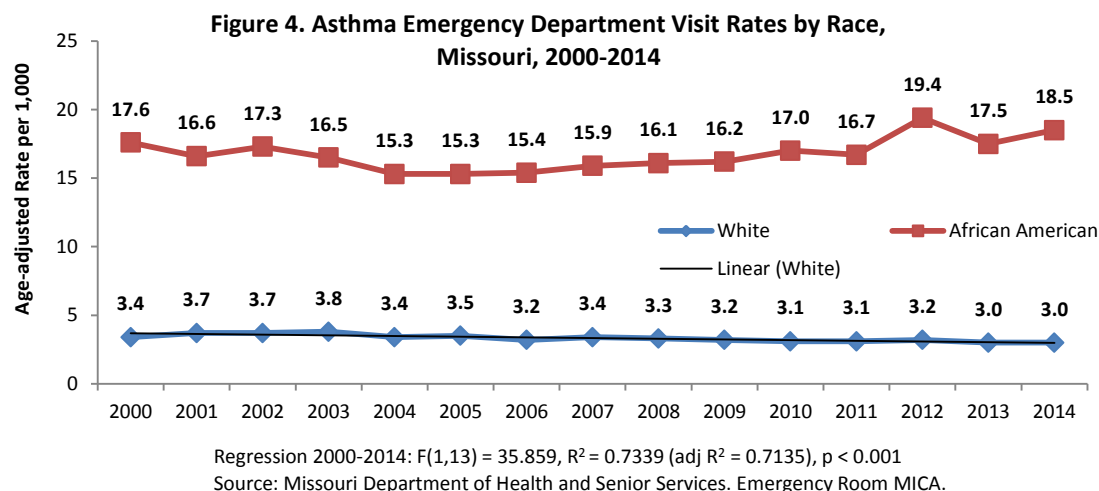
The impact of the asthma prevention and control coordinated efforts was assessed using surveillance data from the Missouri Department of Health and Senior Services (DHSS), Missouri Information for Community Assessment (MICA), MO HealthNet (Medicaid) administrative claims data, and other sources to explore asthma morbidity trends statewide and for selected areas with asthma champions. Trends were assessed using linear regression and 95% confidence intervals.

I. Asthma Emergency Department Visits and Hospitalizations – All Ages

The age-adjusted asthma hospitalization rate decreased significantly from 12.4 (95% confidence interval [CI], 12.1-12.7) in 2000 to 11.5 (95% CI, 11.2-11.8) per 10,000 population in 2014, with a steady decline from 2008-2013 (Figure 3^{*}). Overall, there has been no significant change in emergency department (ED) visits among the state's population during the same time period.



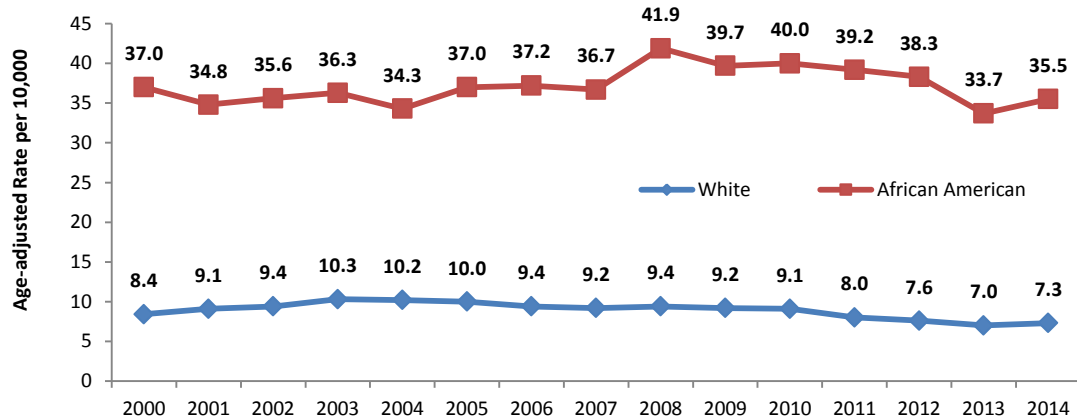
African Americans had significantly higher rates of asthma ED visits than whites (Figure 4^{*}). There has been a significant downward linear trend in asthma ED visit rates among whites from 2000 to 2014, whereas the rate for African Americans increased significantly from 17.6 (95% CI, 17.3-17.9) in 2000 to 18.5 (95% CI, 18.2-18.8) per 1,000 population in 2014.



* Age-adjustment using U.S. 2000 standard population. Missouri Information for Community Assessment (MICA).

African Americans also consistently had significantly higher rates of asthma hospitalizations than whites with a significant decline from 41.9 (95% CI, 40.4-43.5) in 2008 compared to 35.5 (95% CI, 34.1-36.9) per 10,000 population in 2014 (Figure 5^{*}). Among whites, the age-adjusted asthma hospitalization rate decreased significantly from 8.4 (95% CI, 8.1-8.7) in 2000 to 7.3 (95% CI, 7.0-7.5) per 10,000 population in 2014, with a steady decline from 2008 to 2013.

Figure 5. Asthma Hospitalization Rates by Race, Missouri, 2000-2014

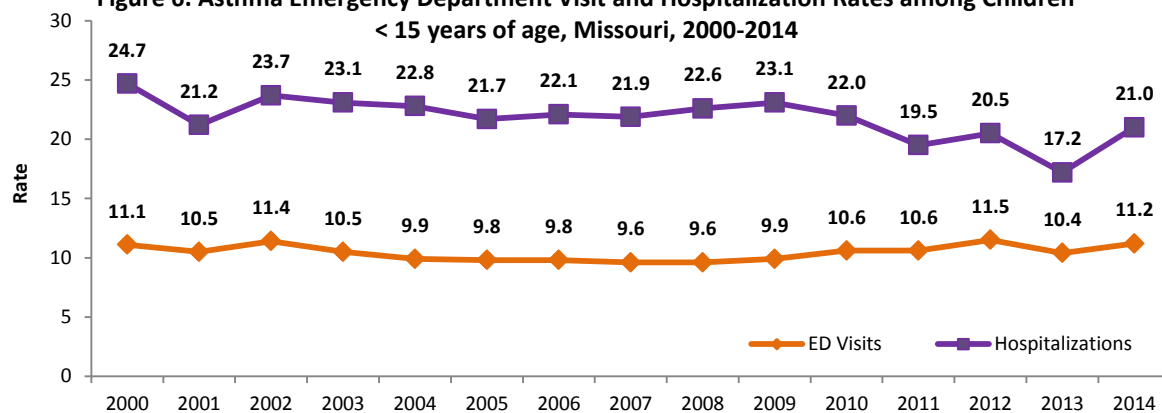


Source: Missouri Department of Health and Senior Services. Hospital Discharges, Charges & Days of Care MICA.

II. Asthma Emergency Department Visits and Hospitalizations – Age 0 to 14

Among children younger than age 15, there has been a significant decline in asthma hospitalization rates from 24.7 (95% CI, 23.8-25.6) in 2000 to 21.0 (95% CI, 20.1-21.8) per 10,000 population in 2014 (Figure 6). There was a significant decline in the ED visit rate from 11.1 (95% CI, 10.9-11.3) in 2000 to 9.6 (95% CI, 9.4-9.8) per 1,000 population in 2007 followed by a significant increase from 9.6 (95% CI, 9.5-9.8) in 2008 to 11.2 (95% CI, 11.0-11.3) per 1,000 population in 2014 resulting in no significant change in ED visits from 2000 to 2014.

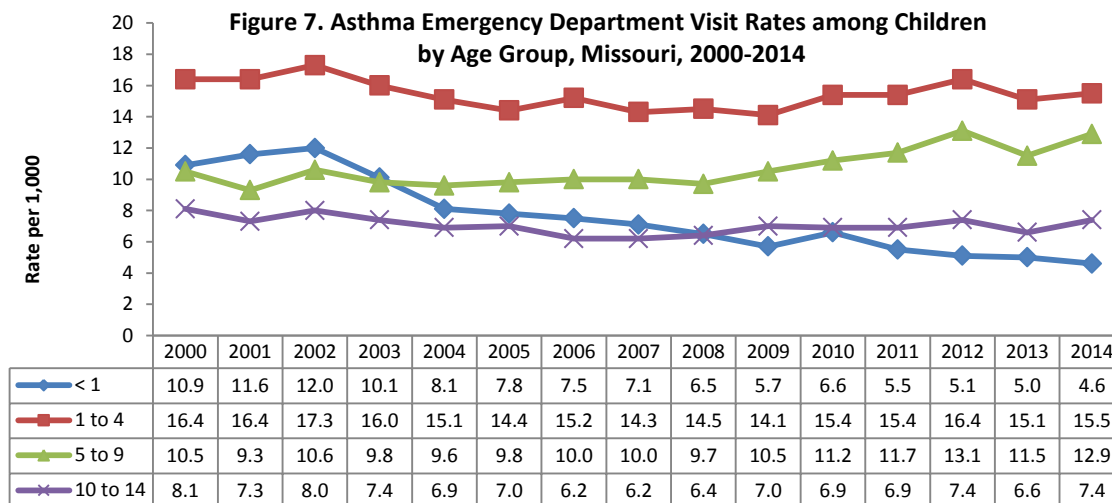
Figure 6. Asthma Emergency Department Visit and Hospitalization Rates among Children < 15 years of age, Missouri, 2000-2014



Source: Missouri Department of Health and Senior Services. Emergency Room MICA and Hospital Discharges Charges & Days of Care MICA; ED visit rates per 1,000 population; Hospitalization rates per 10,000 population.

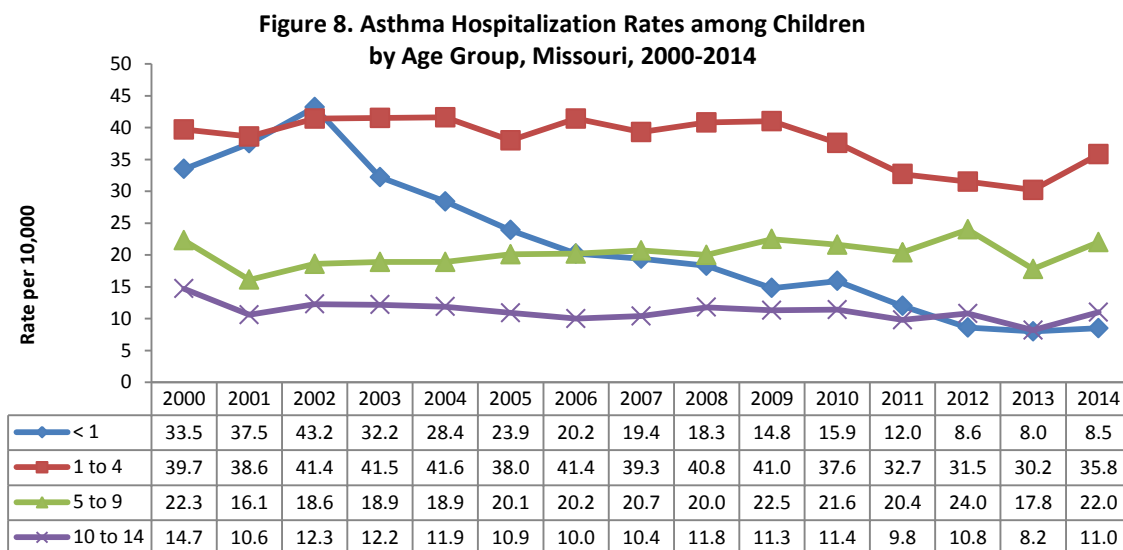
^{*} Age-adjustment using U.S. 2000 standard population. Missouri Information for Community Assessment (MICA).

For children < age 1, there has been a significant decline in asthma ED visit rates from 10.9 (95% CI, 10.1-11.6) in 2000 to 4.6 (95% CI, 4.1-5.1) per 1,000 population in 2014 and a significant decline among children aged 10 to 14 from 8.1 (95% CI, 7.8-8.4) to 7.4 (95% CI, 7.1-7.7) per 1,000 population (Figure 7) for the same time period. However, there was a significant increase in the asthma ED visit rate among children aged 5 to 9 years from 10.5 (95% CI, 10.2-10.8) in 2000 to 12.9 (12.5-13.2) per 1,000 population in 2014.



Source: Missouri Department of Health and Senior Services. Emergency Room MICA.

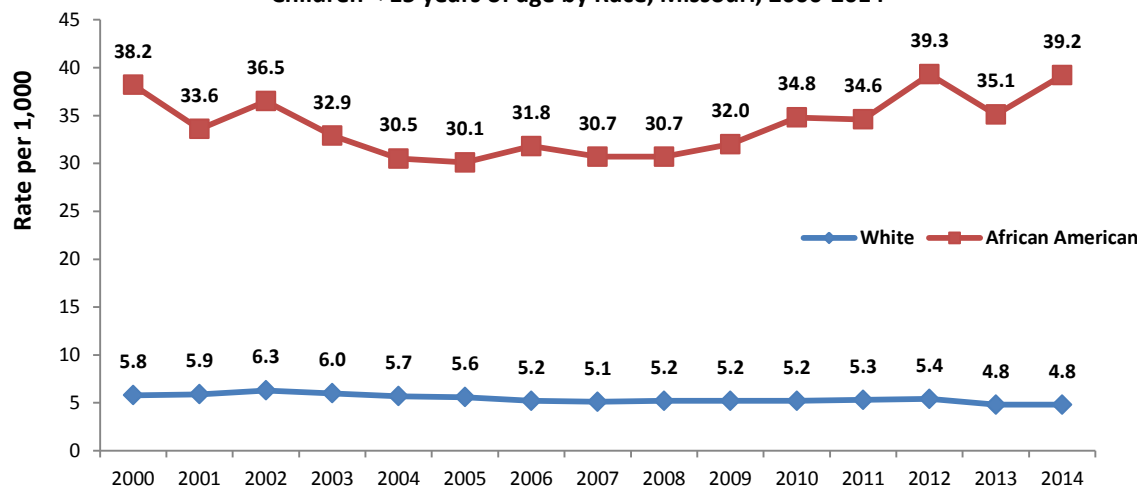
Regarding asthma hospitalization rates among children per 10,000 population, there have been significant declining trends among three of the four age groups: < 1 year from 33.5 (95% CI, 29.6-37.9) in 2000 to 8.5 (95% CI, 6.6-10.9) in 2014 with a downward trend from 2002 to 2013; 1 to 4 years from 41.6 (95% CI, 39.4-44.0) in 2004 to 35.8 (95% CI, 33.7-38.0) in 2014; and 10 to 14 years from 14.7 (95% CI, 13.6-15.9) in 2000 to 11.0 (95% CI, 10.0-12.1) in 2014 (Figure 8). Among children aged 5 to 9 years, there was a significant increase in the asthma hospitalization rate comparing 18.9 (95% CI, 17.5-20.3) in 2004 and 24.0 (95% CI, 22.5-25.6) in 2012.



Source: Missouri Department of Health and Senior Services. Hospital Discharges Charges & Days of Care MICA.

Among white children younger than age 15, there was a significant decline in the asthma ED visit rate from 5.8 (95% CI, 5.6-5.9) in 2000 to 4.8 (95% CI, 4.7-5.0) in 2014 per 1,000 population (Figure 9) and in the hospitalization rate from 14.0 (95% CI, 13.3-14.8) to 11.0 (95% CI, 10.4-11.7) per 10,000 population for the same time period (Figure 10). There was a significant declining trend in the asthma ED visit rate among African-American children between 2000 (38.2; 95% CI, 37.3-39.1) and 2007 (30.7; 95% CI, 29.9-31.5) followed by a significant upward trend comparing 2008 (30.7; 95% CI, 29.9-31.5) to 2014 (39.2; 95% CI, 38.3-40.1) per 1,000 population (Figure 9).

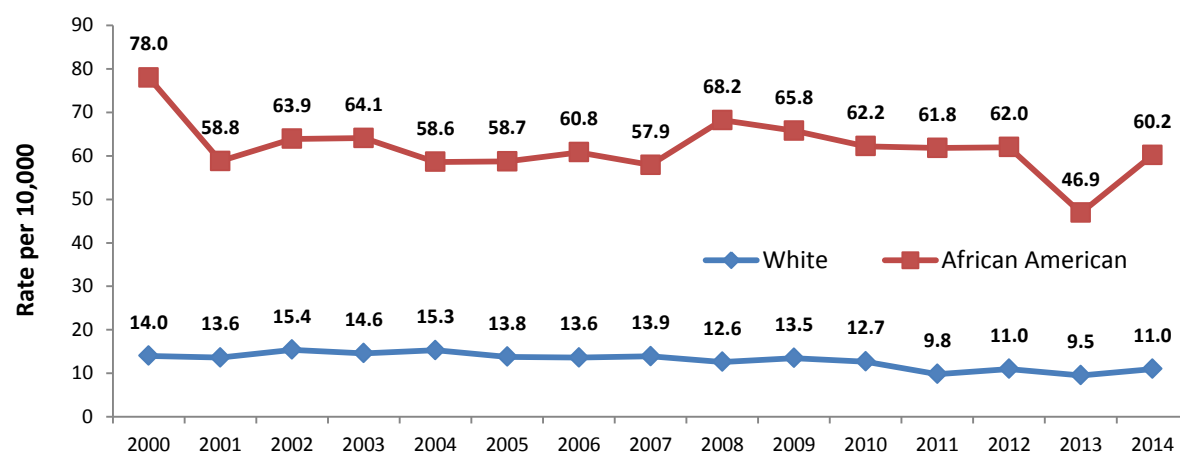
Figure 9. Asthma Emergency Department Visit Rates among Children < 15 years of age by Race, Missouri, 2000-2014



Source: Missouri Department of Health and Senior Services. Emergency Room MICA>

The asthma hospitalization rate among African-American children decreased significantly from 78.0 (95% CI, 74.0-82.2) to 60.2 (95% CI, 56.7-63.9) per 10,000 from 2000 to 2014 (Figure 10). In addition, there has been a 23.1% decrease in the disparity for asthma hospitalizations between white and African-American children.

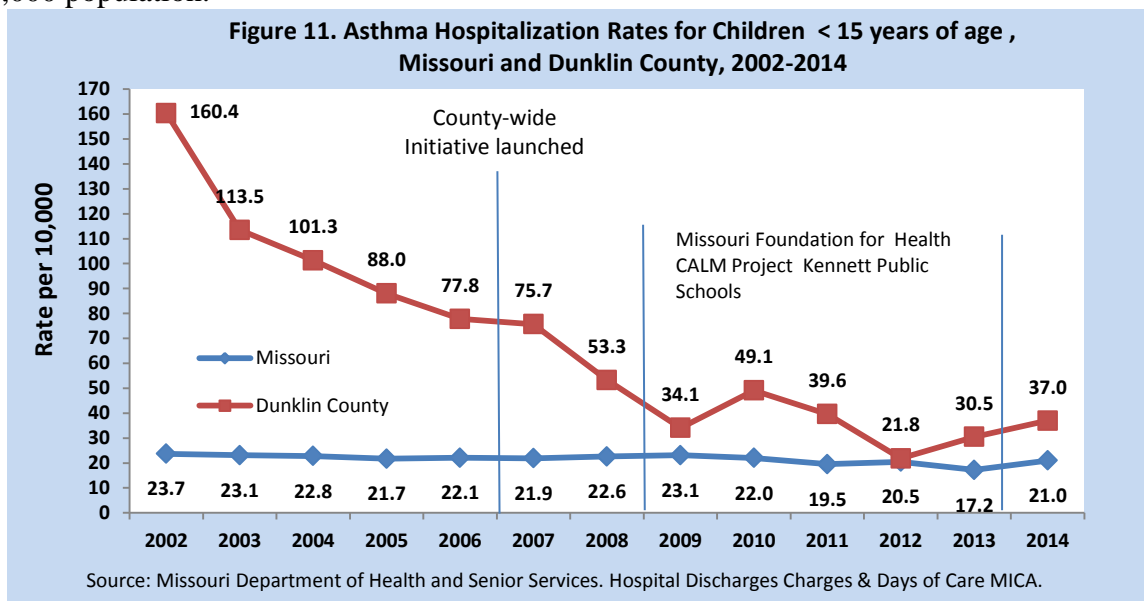
Figure 10. Asthma Hospitalization Rates among Children < 15 years of age by Race, Missouri, 2000-2014



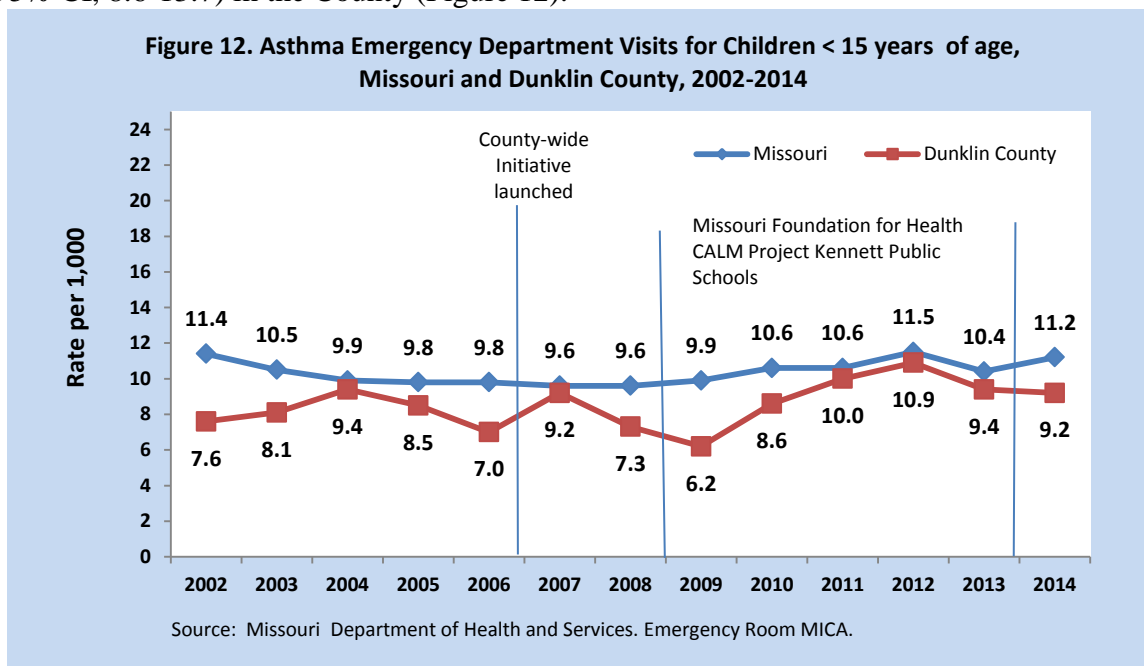
Source: Missouri Department of Health and Senior Services. Hospital Discharges Charges & Days of Care MICA.

III. County Asthma Initiatives

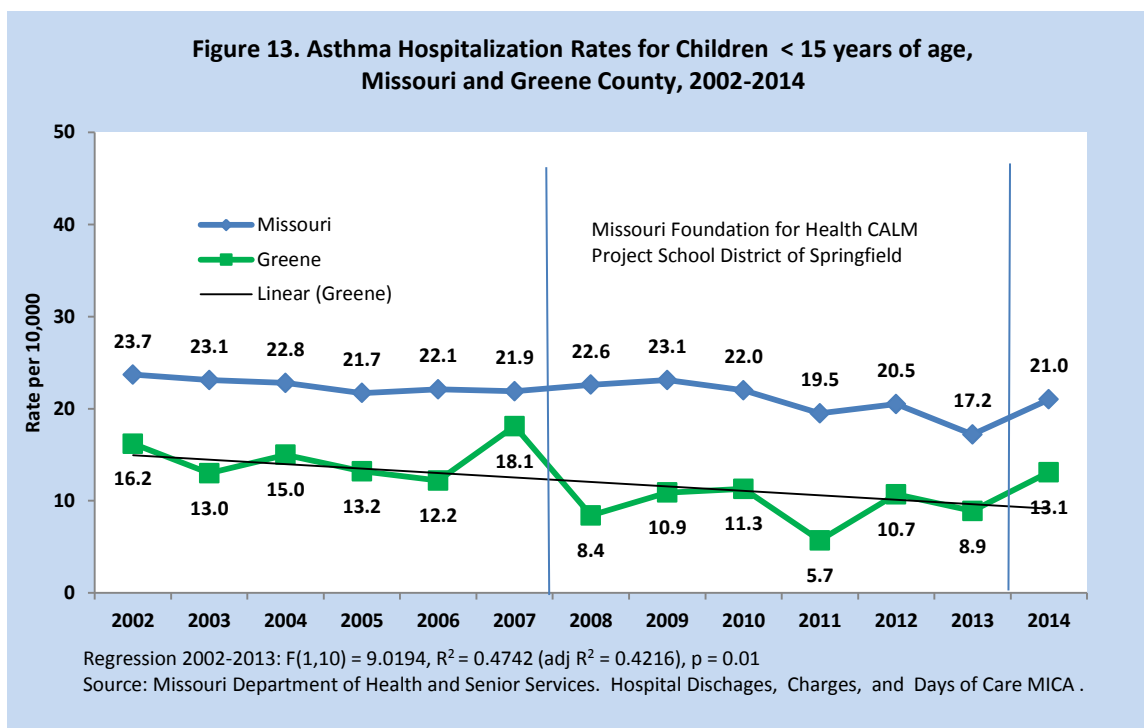
The MAPCP established a county-wide systems-based asthma program in Dunklin County that addressed asthma through linking schools, hospitals, clinics, and child care facilities. The Kennett School District asthma project in Dunklin County was initiated in 2001 with the county-wide initiative beginning in 2007. There has been a significant decline in the asthma hospitalization rate in Dunklin County from 2002 to 2006, declining at a faster rate after 2007 to 2009 among children aged < 15 years (Figure 11). Since 2009, the asthma hospitalization rates have fluctuated but the 2014 rate of 37.0 (95% CI, 23.9-54.6) remained significantly below the 2002 rate of 160.4 (95% CI, 132.3-192.7) per 10,000 population.



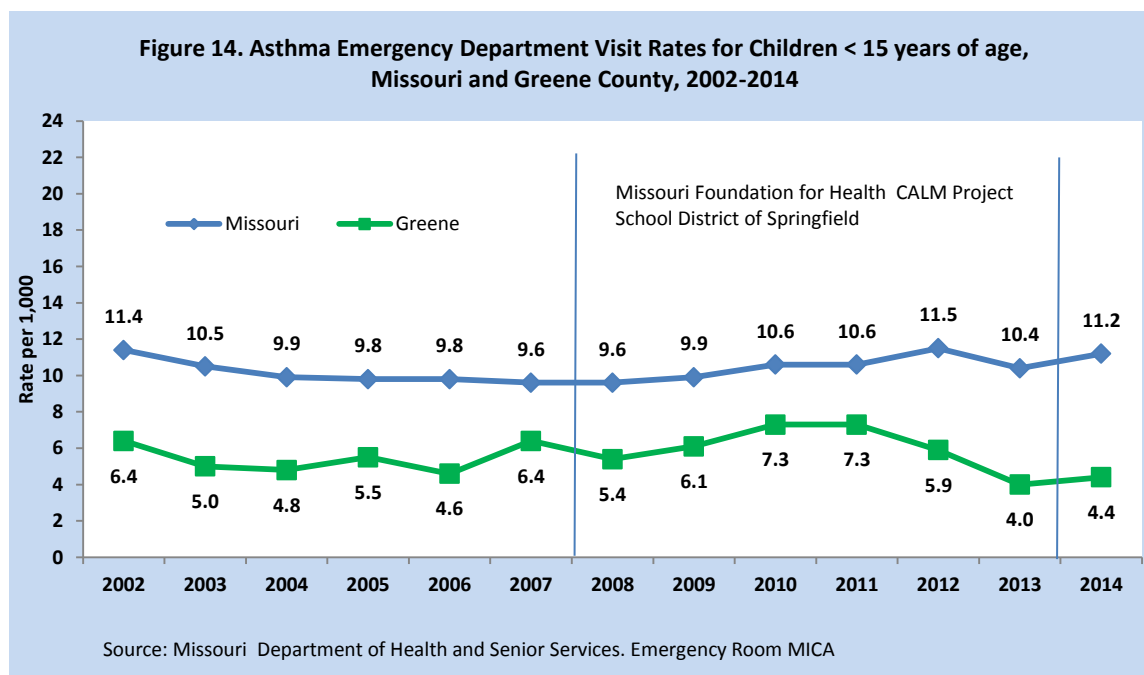
Although the asthma ED visit rates among children in Dunklin County were consistently below the state rates, there was a significant increasing trend between 2009 and 2012 (6.2; 95% CI, 4.5-8.4 vs 10.9; 95% CI, 8.6-13.7) in the County (Figure 12).



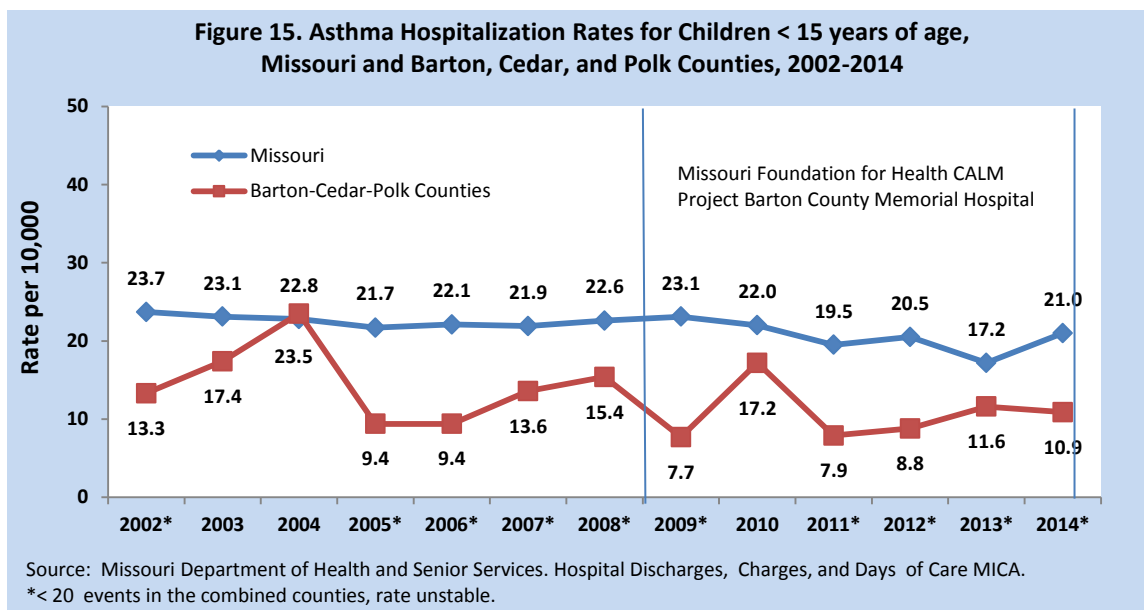
Among children younger than age 15, the asthma hospitalization (Figure 13) and ED visit (Figure 14) rates in Greene County have been consistently below the state rates. In addition, although there was a spike in 2007, there has been a significant decline in asthma hospitalizations in Greene County from 16.2 (95% CI, 12.7-20.4) in 2002 to 8.9 (95% CI, 6.5-12.0) per 10,000 population in 2013.



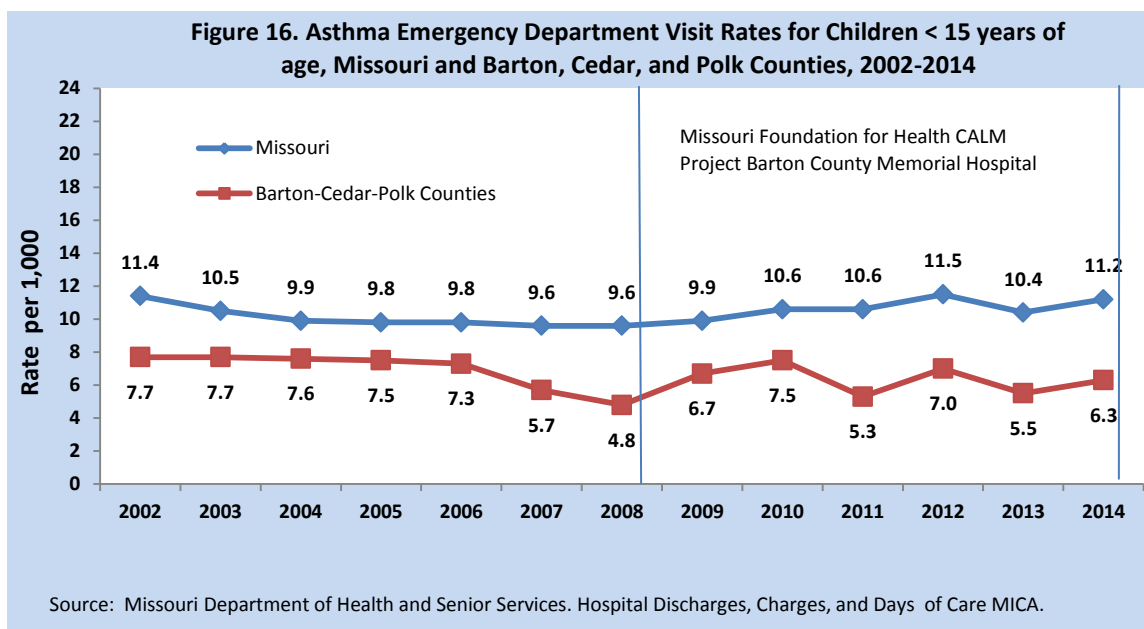
There has also been a significant decline in ED visits in Greene County from 6.4 (95% CI, 5.7-7.2) in 2002 to 4.4 (95% CI, 3.9-5.1) per 1,000 population in 2014.



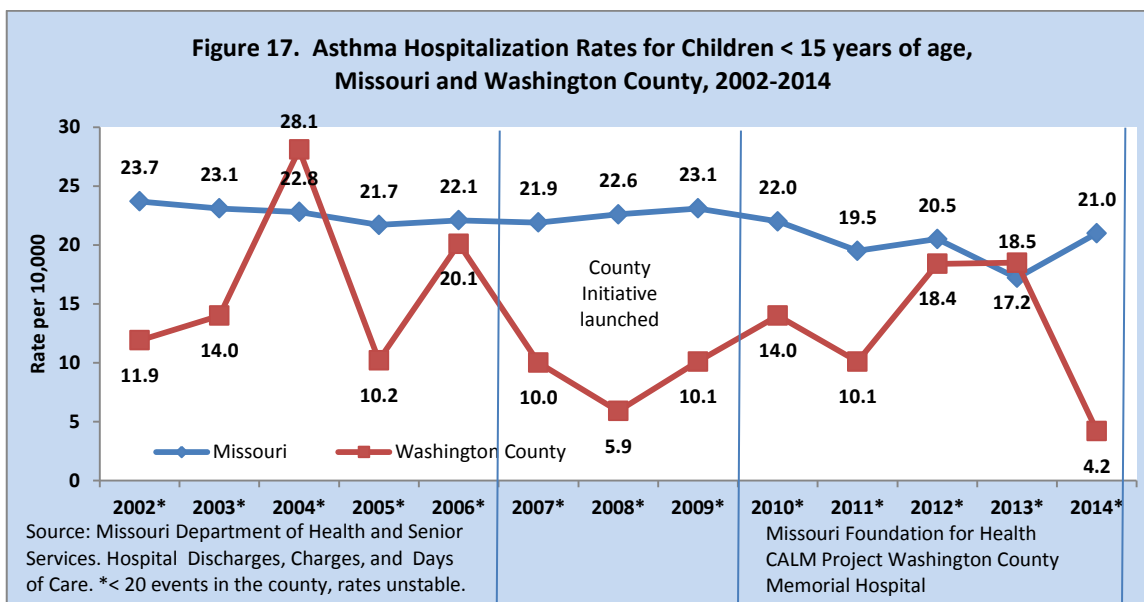
The Barton County Memorial Hospital CALM project began in 2009 and was implemented through 2014. Asthma services were primarily delivered in Barton, Cedar, and Polk counties. Although the asthma hospitalization rates with the exception of 2004 are below the state rates, there were less than 20 cases for 10 of the 13 years which make the rates unstable and fluctuate widely with no clear trend (Figure 15).



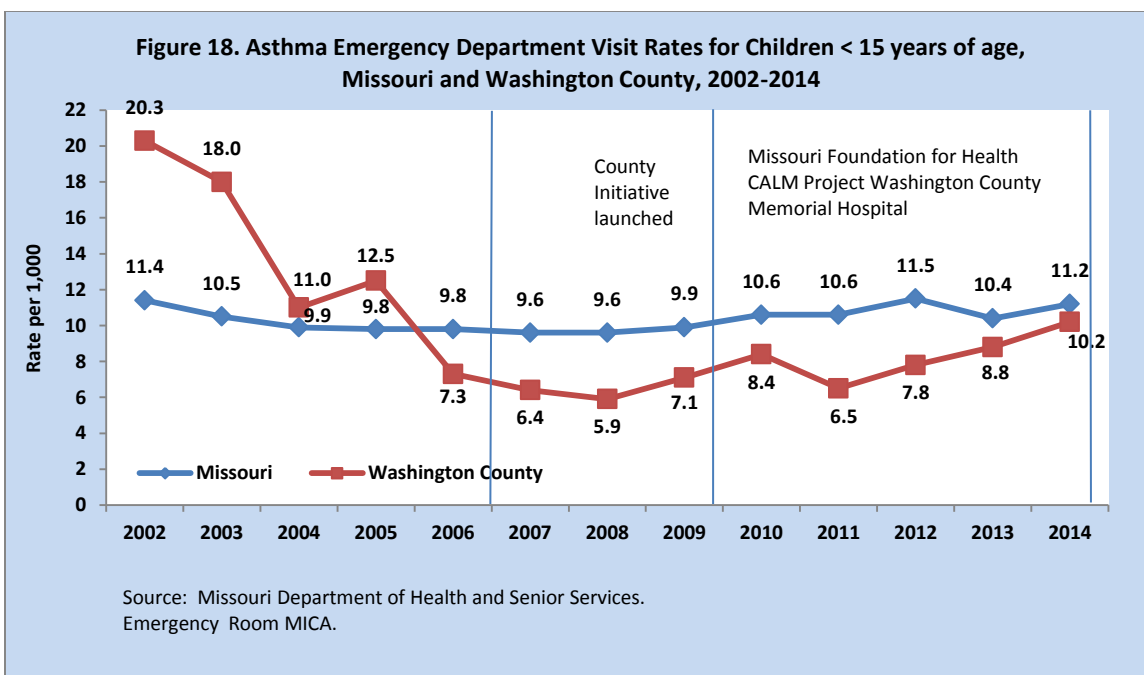
There was a decline in asthma ED visit rates for the three combined counties from 7.7 (95% CI, 6.2-9.5) in 2003 to 4.8 (95% CI, 3.6-6.2) per 1,000 population in 2008 but was not statistically significant (Figure 16). From 2010 to 2014 the ED visit rates have fluctuated with no significant trend.



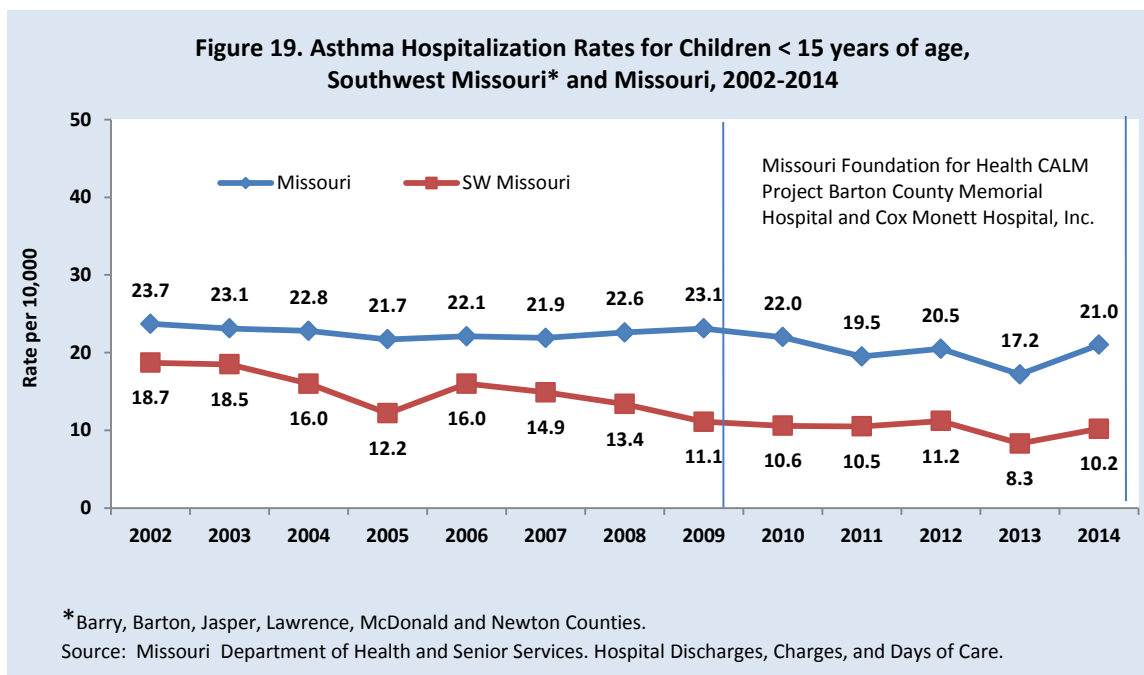
There were less than 20 asthma hospitalizations per year among children age 14 and younger in Washington County so the rates have fluctuated and are unstable (Figure 17).



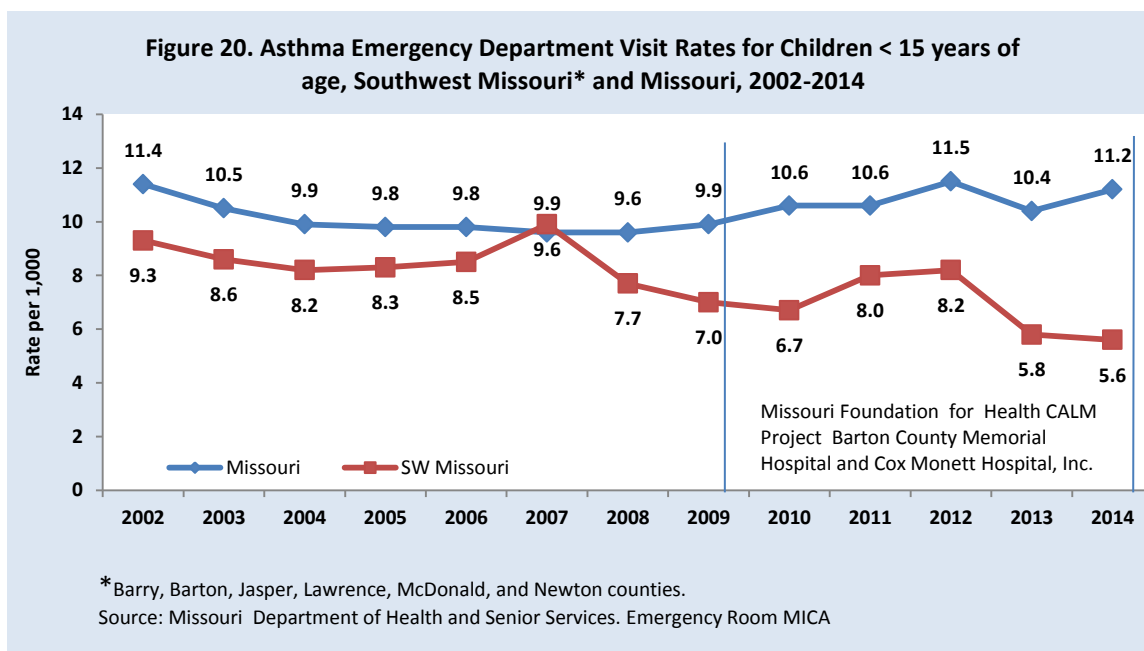
Among children younger than 15 years of age, there was a fast and significant decline in the asthma ED visit rates per 1,000 population in Washington County between 2002 and 2004 (20.3; 95% CI, 16.6-24.6 vs 11.0; 95% CI 8.3-14.4). With the exception of an increase in 2005, the decline continued to 2008 (5.9; 95% CI 4.0-8.5). Although the rates increased from 2011 to 2014 (not significantly), overall there has been a significant decline in asthma ED visit rates among children in Washington County between 2002 and 2014 (10.2; 95% CI, 7.5-13.5) with the rate reduced by almost one-half between these years (Figure 18).



Among children age 14 and younger, the asthma hospitalization rates in the combined six counties of SW Missouri were consistently below the state rates. In this geographical area, there was a significant decline in asthma hospitalization rates from 18.7 (95% CI, 15.4-22.6) in 2002 to 12.2 (95% CI, 9.5-15.3) per 10,000 in 2005 with a further steady decline from 2006 to 2011 resulting in an overall significant decline from 2002 to 2014 (10.2; 95% CI, 7.8-13.1)(Figure 19).



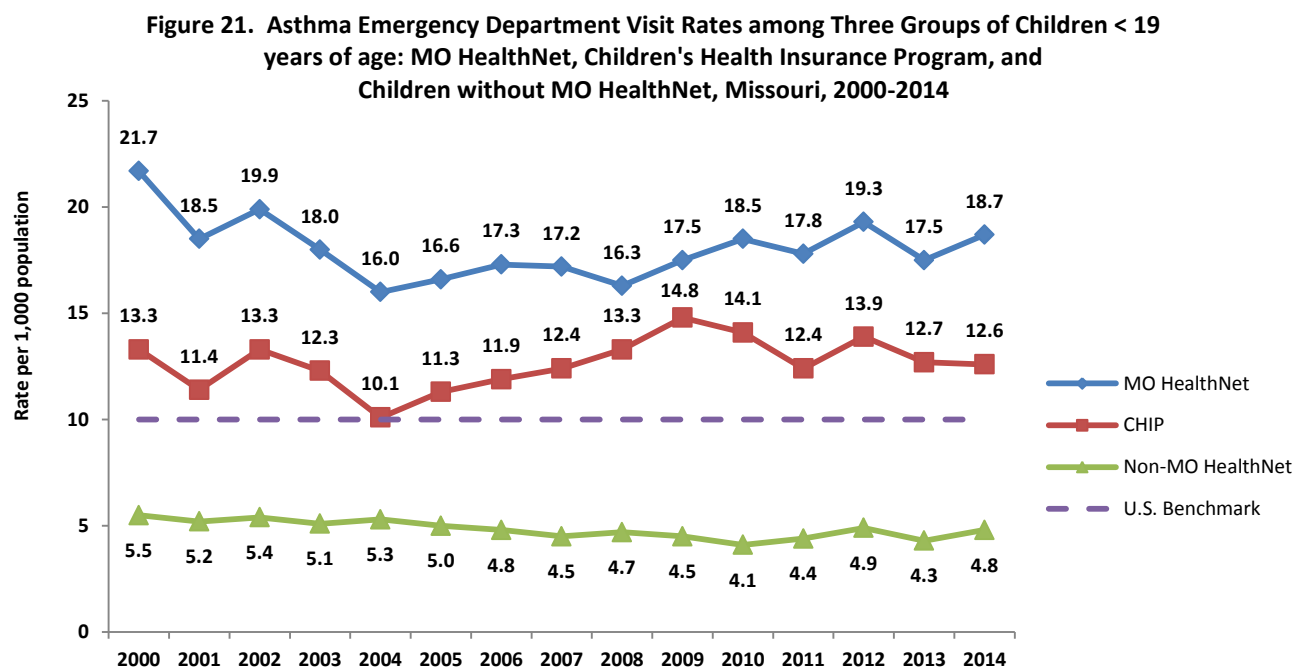
The asthma ED visit rates in the combined six counties in SW Missouri were also consistently below the state rates with the exception of 2007, with a significant decline from 9.3 (95% CI, 8.5-10.1) in 2002 to 5.6 (95% CI, 5.1-6.3) per 1,000 population in 2014. (Figure 20).



IV. MO HealthNet (Medicaid) and the Children's Health Insurance Program

The Missouri Department of Social Services (DSS) provides health care for uninsured children through the Children's Health Insurance Program (CHIP). In 2007, Missouri's CHIP began operating as a combination Medicaid/CHIP program, entitled *MO HealthNet for Kids*.¹⁹ The program provides health insurance for children 0 to 18 years of age with premiums for families with incomes greater than 150% of the federal poverty level (FPL), except for families with infants < 1 year of age are not subject to premiums unless their family income exceeds 196% FPL.

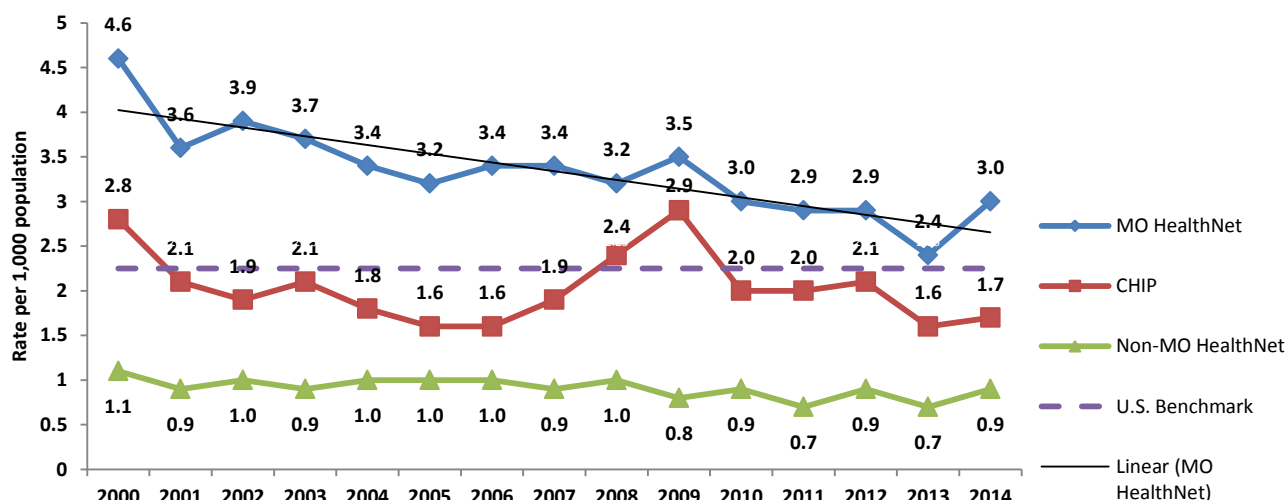
From 2000 to 2014, asthma ED visits for the CHIP population decreased by 5.4% and decreased by 13.8% for the MO HealthNet (Medicaid children) population (Figure 21). For the same time period, the asthma ED visits for the non-MO HealthNet group decreased by 12.7%. In 2014, the CHIP asthma ED visit rate of 12.6 per 1,000 children remained 26% higher than the national benchmark of 10 asthma ED visits per 1,000 children.



Source: Missouri Department of Social Services. Missouri Children's Health Insurance Program (CHIP) and Show Me Healthy Babies Annual Report 2016

From 2000 to 2014, there was a significant decrease in asthma preventable hospitalizations among MO HealthNet (Medicaid children) population (-34.8%, $p < 0.001$) and for the non-MO HealthNet group (-18.2%) (Figure 22).^{*20,21,22} Preventable asthma hospitalizations for the CHIP population decreased by 39.0%. In 2014, the CHIP preventable hospitalization rate of 1.7 per 1,000 children was 24% lower than the national benchmark rate of 2.25 asthma preventable hospitalizations per 1,000 children. The MO HealthNet population remained 33% higher than the national benchmark.

Figure 22. Asthma Preventable Hospitalization Rates among Three Groups of Children < 19 years of age: MO HealthNet, Children's Health Insurance Program, and Children without MO HealthNet, Missouri, 2000-2014



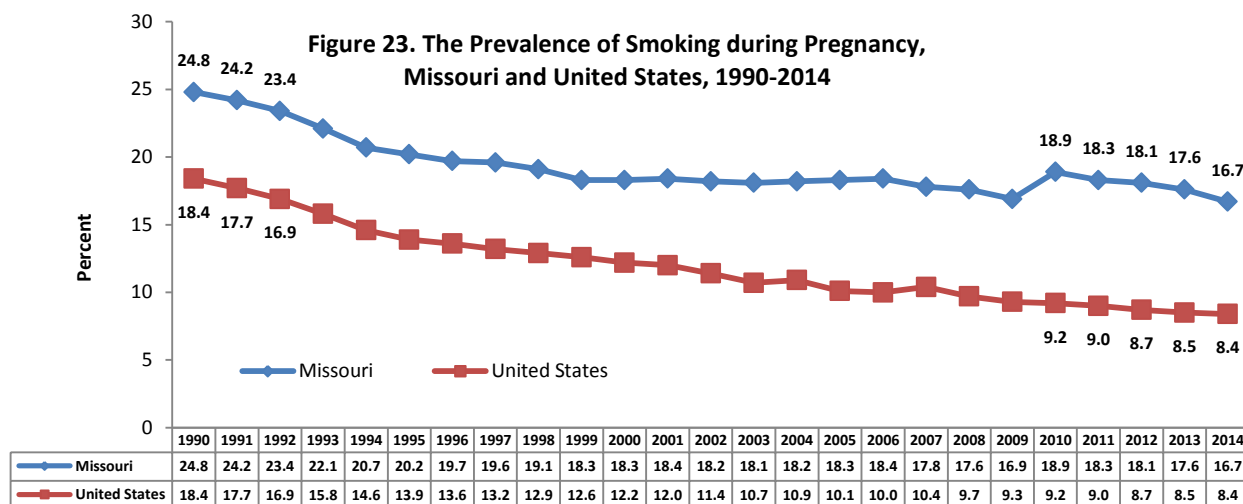
Regression 2000-2014: $F(1,13) = 35.042$, $R^2 = 0.7294$ (adj $R^2 = 0.7086$), $p < 0.001$

Source: Missouri Department of Social Services. Missouri Children's Health Insurance Program (CHIP) and Show Me Healthy Babies Annual Report 2016

* **Preventable hospitalizations** (also called ambulatory care sensitive conditions) are "diagnoses for which timely and effective outpatient care can help to reduce the risks of hospitalization by either preventing the onset of an illness or condition, controlling an acute episodic illness or condition, or managing a chronic disease or condition..."

IV. Asthma Risk Factor – Smoking among Pregnant Women

As shown in figures 7 and 8, for children < age 1 from 2000 to 2014, there have been significant declining trends in asthma ED visits and hospitalizations. Likely contributing to the declines is the significant decline in smoking among pregnant women in Missouri and in the United States. In Missouri, smoking among pregnant women declined from 24.8% (95% CI, 24.4%-25.0%) in 1990 to 16.7% (95% CI, 16.3%-16.9%) in 2014 (Figure 23). Nevertheless, the prevalence of smoking among pregnant women in Missouri remains almost twice that of the U.S. in 2014 (16.7% vs 8.4%).



Sources: Missouri Department of Health and Senior Services. Birth MICA. <http://health.mo.gov/data/mica/BirthMICA/index.html> and U.S. Centers for Disease Control and Prevention, National Center for Health Statistics. *National Vital Statistics*. <http://wonder.cdc.gov/natality-current.html>

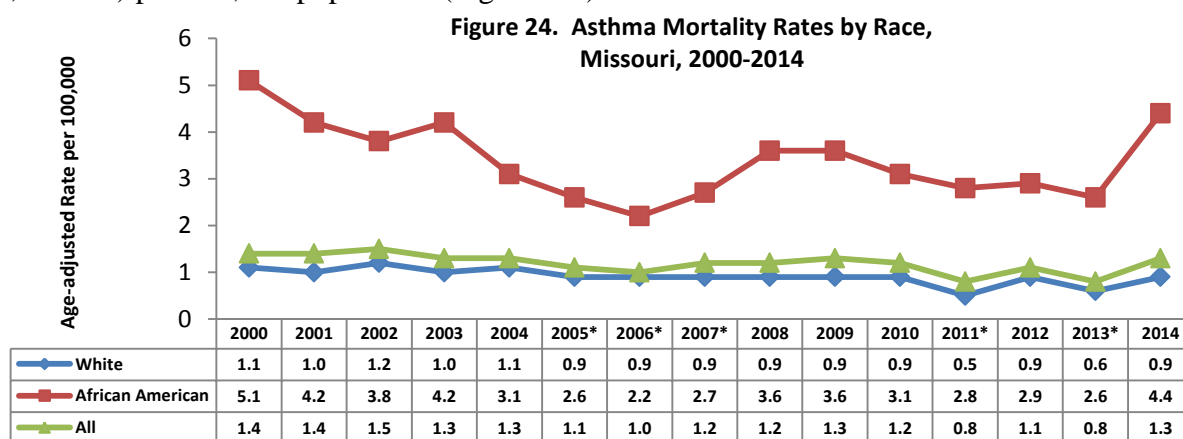
Health Outcomes Evaluations

The MAPCP and partners conduct quality improvement process and health outcomes studies. These studies have contributed to further improving asthma care and control among children. The MAPCP has launched evaluations of two large scale asthma control strategies: The Early Childhood Asthma Initiative and Teaming Up for Asthma Control. The ECAI provided asthma control training, tools, and equipment to staff in local public health agencies (LPHAs) statewide. The staff provided information to childcare centers on indoor air quality assessments and asthma triggers and education to families on in-home air quality and asthma management in pre-school children. The objective of this study was to assess the outcomes of participation in this initiative for educators, children and child care facilities.

TUAC is a work force development intervention aimed at promoting school nurse competency for assessing and caring for students with asthma. This project addresses a critical need – asthma control is impeded because children are not receiving asthma status assessments and education for self-care as often as needed. The aim is to improve asthma control by increasing asthma monitoring by school nurses trained in asthma management, promoting asthma literacy using culturally appropriate material and messages, and enhancing self-care behaviors among students (grades K to 6) with persistent asthma and their families. These interventions have shown participants to have improved lung function, inhalation technique, psychosocial indicators, and use of control medication (i.e., inhaled corticosteroids); and reduced impairment and tobacco smoke exposure.^{12,23} In addition, for children enrolled in TUAC and MO HealthNet, there was a decline in the 12-month total health care utilization cost.²³

Mortality

In 2014, 85 people died with asthma as the underlying cause for an age-adjusted asthma death rate of 1.3 per 100,000 people. Five of the 85 deaths were children younger than age 15. The mortality rate was highest among individuals 65 years of age and older at 2.7 per 100,000 population. Women had a slightly higher rate than men (1.5 versus 1.1 per 100,000 population), but the difference was not statistically significant. There has been a significant decline in asthma mortality rates among whites from 1.1 (95% CI, 0.8-1.4) in 2000 to 0.5 (95% CI, 0.3-0.7) per 100,000 population in 2011. There has also been a decline but not significant in asthma mortality among African Americans from 5.1 (95% CI, 3.3-7.4) in 2000 to 4.4 (95% CI, 3.0-6.3) per 100,000 in 2014, although for several years (2005-2007, 2011 and 2013) there were less than 20 deaths among African Americans resulting in unstable rates. However, in 2014 significantly more African-Americans died of asthma than whites, 4.4 (95% CI, 3.0-6.3) versus 0.9 (95% CI, 0.6-1.1) per 100,000 population. Among all groups combined, there was a significant decline in asthma mortality between 2000 (1.4; 95% CI, 1.2-1.8) and 2013 (0.8; 95% CI, 0.6-1.0) per 100,000 population (Figure 24*).



Year* - Less than 20 deaths among African Americans rate is unstable.

Source: Missouri Department of Health and Senior Services. Death Missouri Information for Community Assessment.

Conclusion

Reducing the morbidity associated with asthma remains a significant public health challenge in Missouri and in the nation. The progress toward reducing the burden of asthma is demonstrated in the overall decline in asthma hospitalizations, disparities, and deaths in Missouri, but more needs to be done with substantial disparities persisting. Progress has been shown in outcomes with both the Early Childhood Asthma Initiative and Teaming Up for Asthma Control having shown improved health care coordination and health outcomes among children with asthma. In addition, the asthma interventions are reducing overall asthma hospitalizations across the State of Missouri, emergency department visits in some areas with asthma champions, and health care utilization costs among pediatric populations.

Long-term progress in reducing the burden of asthma will require continued efforts, support, public health – health care partnerships, and widespread collaborations with stakeholders, policy and decision makers, health agencies, insurers, and other programs. Community, state, and national efforts to promote comprehensive asthma control continue to be essential to reduce the burden, disparities, and costs of asthma.

* Age-adjustment using U.S. 2000 standard population. Missouri Information for Community Assessment (MICA).

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